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RD CONTEST

Please note this year the Contest Co-ordinator only requires summary sheets – logs are not required.

Feedline Losses and VSWR

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FOR THOSE INTERESTED IN THE effect of feeder losses on VSWR measurement at VHF, here is some food for thought.

To achieve the SWR readings shown below I have used the following figures:

1. Frequency 146MHz
2. Feeder length 30 metres

a) RG8 has a loss of around 3dB at 146MHz

b) RG58 has a loss of around 6dB at 146MHz

SWR Reading at Transmitter	Coax	SWR at Antenna
1.1:1	RG8	1.21:1
1.2:1	RG8	1.44:1
1.5:1	RG8	2.33:1
1.6:1	RG8	2.71:1
1.7:1	RG8	3.14:1
1.8:1	RG8	3.65:1
1.9:1	RG8	4.25:1
2.0:1	RG8	4.67:1
1.1:1	RG58	1.47:1
1.2:1	RG58	2.13:1
1.5:1	RG58	8.81:1
1.6:1	RG58	23.6:1

The results for RG58 show that a large increase in SWR at the antenna will only give a very small increase at the transmitter.

A Practical Example

Using a typical twin-needle SWR meter you obtain the following readings:

Forward power = 16 Watts, reflected power = 1 Watt

VSWR (where the needles cross) = 1.7:1

While 1.7:1 is not a particularly good reading, it is quite acceptable, and most VHF transmitters would produce close to full output (16 watts or more from a 20-watt TX).

What do these readings mean?

1. If you used RG8, you probably have a VSWR of 3.14:1 at the antenna. This is a fairly high figure and it should be possible to improve it by making various antenna adjustments.
2. You used RG58. This situation is very different than the previous one. It indicates that your antenna may not be connected, or there is a short/open circuit at or near the feed point.

How did I arrive at the answer for RG58?

The two power figures shown above give the reason. If you feed 16 watts into a cable that has 6dB loss, only four watts will arrive at the other end (6dB is a power ratio of 4:1). A cable that is not terminated or has a short circuit will reflect all of the power that arrives there. This means that four watts will be fed back down the cable. Again a 6dB loss will occur, and only one watt will arrive at the SWR meter. The ratio of 16 watts forward to one watt reflected is a VSWR of 1.67:1.

Summary

This has been a brief look at VSWR from a practical angle. You may think I haven't been very practical in looking at an antenna feedline using 30 metres of RG58.

How often have you heard of someone using a long length of thin cable of dubious origin?

A shorter length of poor quality cable, or a length of good quality cable that has been damaged could have losses exceeding 6dB.

Don't think you are safe because you have used the best quality cable you could afford.

(a) What happens if water gets into the cable?

(b) What happens after a few years of flexing and UV exposure?

(c) Some cables suffer from contamination due to the plasticiser used in the outer jacket.

(d) The figures provided are for VHF; by how much does the loss increase if you decide to move up to 430-440MHz or higher?

It makes common sense to use the materials you have at hand or can afford. High feeder loss may not be a problem where there is sufficient power output, or signal strength is very high.

At times I have deliberately introduced additional feeder loss so that the transmitter will see a reasonable VSWR when using an antenna not designed for that frequency.

Try using an external, elevated 70cm antenna instead of the rubber ducky on your handheld. If the existing feeder has 2dB loss at 2m, and the VSWR is approximately 3:1 (at the bottom of the co-ax, 9:1 at the antenna), a 20m length of RG58 will bring the VSWR down to 1.5:1).

I have provided this information to help you make more sense out of the readings you obtain when measuring VSWR at the shack end of your co-ax. Just be aware of what effects feeder loss may have on the readings you take.

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